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INHERITANCE OF DARK HEAD AND SIPHON IN THE LARVAE OF *CULEX QUINQEFASCIATUS* SAY

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ABSTRACT

A new spontaneous mutation (dh) is described for *Culex quinquefasciatus* Say. This phenotype was observed in the second generation to cause complete coloration of the head capsule and the siphon of the larvae. This character is mainly detectable in the larval stage and slightly in the adult stage.

The reciprocal mass matting between mutants from F2 generation and normal wild type sibs, revealed that the mode of inheritance can be controlled by an autosomal recessive gene(s). This happened for both sexes with slightly variability in their expression. No significant larval mortalities were found in all crosses.

INTRODUCTION

Culex quinquefasciatus Say a species of *pipien*s complex is well known, medically important mosquito. It transmits virus diseases in several parts of the world, also it is involved in the epidemiology of Filariasis in many tropical area as well as st. louis encephalitis.

Among mosquito species, *Culex quinquefasciatus* is one of the wildly distributed one in the world. No records on diseases transmitted by this species has been reported for Iraq so far.

Several investigators; Chong (1972), Guptavanij & Barr (1979,82) and Vandehey (1967) have studied relationship between the infection agent and the genetics of *Culex mosquitoes* to provide a basis of control for this species. In *Culex pipiens* complex.

Barr (1975) listed 47 mutants affecting larval, pupal and adult stages. Others; Dubash *et al.* (1982), Sharma *et al.* (1977) and Subbaraw &Adak (1978) have also found several mutants. Although a large number of mutations have been reported for this complex there is a striking lack of phenotypic markers for *Culex quinquefasciatus* which are essential in may genetic studies. Mutants affecting eye and body color extensively studied by Sakai *et al.* (1980), Shetty & Chowdaiah (1976) and Subbaraw & Adak (1978). In Iraq only two mutants of this species were found to affect larval growth (Ouda *et al.*, 1986 and Ouda & Mehdi, 1988).

The purpose of this study is to describe a new spontaneously isolated for this species and its mode of inheritance.

MATERIALS AND METHODS

Several samples of mosquito larvae were collected and brought from Jadiriyah square/Baghdad in 1992. The samples then reared in the laboratory. The dark head and siphon larvae were isolated from a second generation of an inbreed line. This is considered as a mutant of the larvae. The later caused complete coloration of the head capsule and the siphon. However, the scape of the antenna and an area around the eyes were pale in color. The head capsule of the mutant larva was rather spherical and wider than normal (Fig. 1).

This character is mainly detectable in the larval stage and slightly in the adult stage, moreover the mutant larvae were easy to distinguish from normal individuals. Although the

larval instars of the mutants were all pigmented, separation of the mutant phenotype was not easily accomplished with first instar due to their size.

In order to determine the mode of inheritance, recoprocal mass mating were made between mutants from F2 generation and normal wild type sibs. The egg rafts were isolated and reared as individual families in a half litter plastic dishes. The larvae were fed on rabbit chaw reared in a glass door incubator at 28-1C°. The crosses were reported between individual of three successive generation.

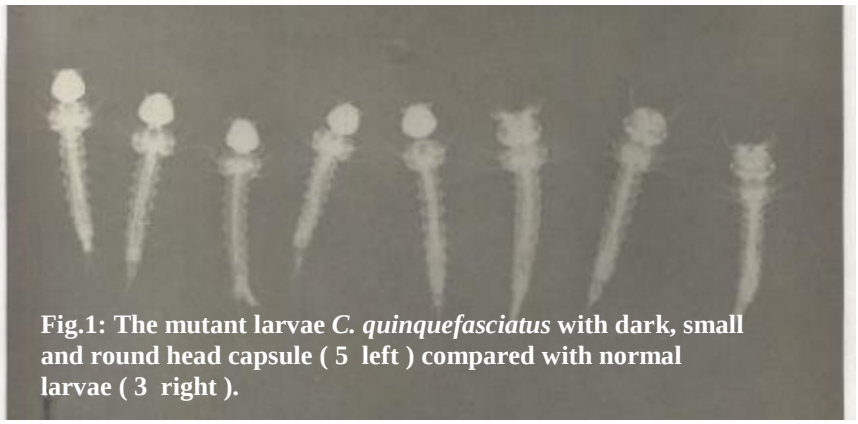

Fig.1: The mutant larvae *C. quinquefasciatus* with dark, small and round head capsule (5 left) compared with normal larvae (3 right).

RESULTS AND DISCUSSION

The breeding scheme Fig(2) shows reciprocal crosses between mutant individual and normal phenotypes. The later is the progeny of mass crosses of mutants for the wild types. The off springs of both crosses had dark head individuals, but had vary little sex linkage to the (dh) gene or sex influenced expressions. This finding is incontrast to results obtained by Vandehey (1967). His results showed that similar phenotype in *Culex pipiens* is inherited as sex linked-gene.

Inbreeding of the progenies of normal phenotype individuals resulted from the crosses for the two generations produced similar ratios of wild to mutant phenotype in both F2 and F3 progenies (Fig. 3). The dark head that yielded from the above inbreeding had fewer individuals in F2 and F3, and their percent were 1.9 and 5.2 respectively.

The inbreeding of dark line in two crosses produced few wild phenotype individuals in their F1 and F2. This indicates that the expression of the character is slightly low.

When a reciprocal mass mattings between the mutants of F2 generation and the normal wild type sibs, were made few dark head individuals resulted from their F3 progenies (13.9% and 4.3%) in fig. 4.

The results presented in table 1 revealed that this phenotype is probably controlled by an autosomal recessive gene (s) with incomplete penetrance in both sexes and with slightly variable expression. The homozygous conditions of the mutant is variable in both sexes, but a phenotype of slow growing larvae was also observed in most families of all generation in various frequencies. Larval mortalities in most of the crosses were not significantly different. To determine the linkage group of the gene(s) and its mode of inheritance, further analysis should be made using large number of follow-up crosses as well as its interaction and/or linkage to other genes that already mapped for this species. Such mutations could be valuable tool for genetic control of this vactor.

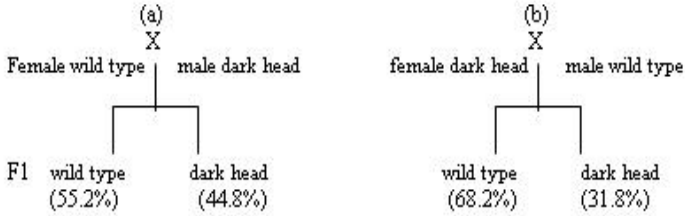

Fig. 2: Breeding scheme showing comparision of the crosses between: (a) wild type female female with dark head male, and (b) dark head female with wild type male.

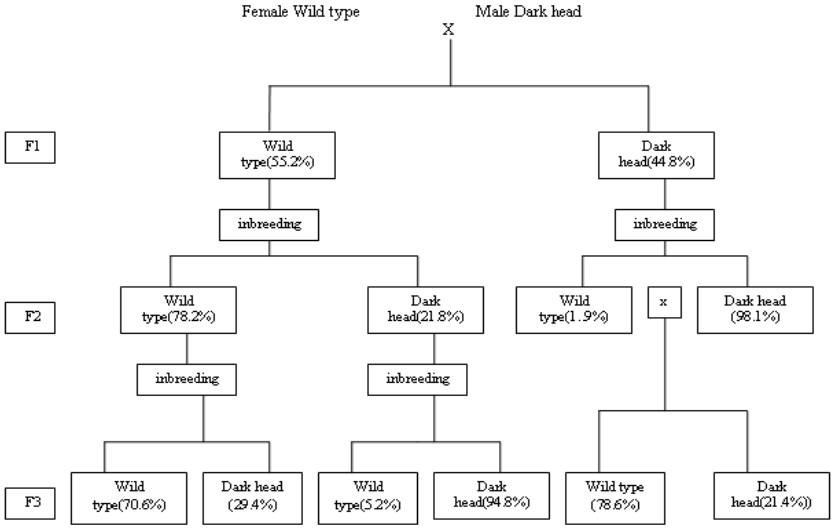

Fig. 3 : Breeding scheme showing crosses between wild type and dark head (dh) individuals with their offspring for first and second generation .

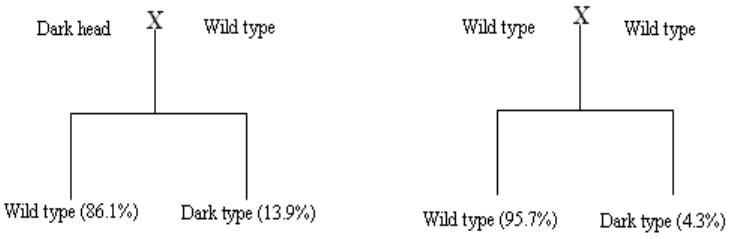

Fig.4: Breeding scheme showing reciprocal mass mating between mutants from F2 generation and normal wild type sibs.

Table 1: Summary of crosses showing that dark head and siphon (dh) is a recessive trait with incomplete penetrance and variable expression.

Cross	Parental phenotype		No. of families	Progeny phenotype		% larval mortality
	Female	Male		+	dh	
A	dh	F1(dhXdh+)	10	441	206	24.9
B	F1(dhXdh+)	dh+	9	222	180	29.8
C	dh	dh	19	37	1485	-
D	F1(dhXdh+)	F1(dhXdh+)	12	678	178	-
E	+	dh	12	605	158	14.2
F	dh	+	3	173	28	15.1
G	F2dh	F2dh	6	23	422	4.3
H	F2(dhXdh+)	dh	2	339	141	16.8
I	F2(dhXdh+)	F2(dhXdh+)	6	342	142	26.8
J	dh	F2(dhXdh+)	7	446	73	22.8
K	+	+	3	198	9	15.2

linkage to other genes that already mapped for this species. Such mutations could be valuable tool for genetic control of this vector.

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توارث صفة السواد في الرأس والسيفون لبعوضة ***Culex quinquefasciatus*** **Say**

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الخلاصة

تم وصف طفرة جديدة لنوع البعوض *Culex quinquefasciatus* وقد لوحظت هذه الصفة لاول مرة في الجيل الثاني حيث يميز هذه الطفرة التلون الكامل لرأس اليرقات والسيفون بلون غامق عدا قاعدة قرون الاستشعار في الرأس إضافة إلى كون رأس اليرقات الطافرة غالباً اكثر استدارة من رأس اليرقات الاعتيادية. ولقد تم إجراء تزاوجات متعاكسة جماعية بين الأفراد الطافرة من الجيل الثاني والأفراد الاعتيادية أظهرت النتائج بان المظهر الموصوف قد يكون مسيطراً عليه بواسطة جين أو جينات جسمية متنحية مع احتمال وجود حالة عدم النفوذ الكامل في كلا الجنسين وتعبير متغاير إلى حد ما.